

# Solve 2-step equations

## Notes and guidance

In this small step, children move on to solving equations with two steps.

As with 1-step equations, initially equations of this type can be represented by 2-step “think of a number” problems and/or function machines, where children work backwards using inverse operations to find the original number or input. They can then link this to finding an unknown in a 2-step equation.

Children can also use concrete resources to represent the problems and to work out missing numbers. Bar models are another useful representation, as they give a visual clue to the steps needed to work out the unknowns. It is useful to have the abstract representation alongside the models to help develop understanding.

### Things to look out for

- Children may think the values of letters are permanently fixed. For example, having solved an equation for  $x$ , they may apply this value for  $x$  to a different equation.
- When “working backwards” to solve equations, children may do the inverse operations in the wrong order.

## Key questions

- If you know 3 more than  $2x$ , how can you work out  $2x$ ?
- If you know 5 less than  $2x$ , how can you work out  $2x$ ?
- How can you represent the problem with a bar model? Which part(s) of the bar model do you already know? Which part(s) can you work out?
- How can you represent the problem with an equation? What is the first step you need to take to solve the equation?
- How can you represent the equation using a function machine? How can you use the function machine to help you solve the equation?

## Possible sentence stems

- If \_\_\_\_\_  $x$  + \_\_\_\_\_ = \_\_\_\_\_, then \_\_\_\_\_  $x$  = \_\_\_\_\_, so  $x$  = \_\_\_\_\_
- The first step in solving the equation is to \_\_\_\_\_  
The second step in solving the equation is to \_\_\_\_\_

## National Curriculum links

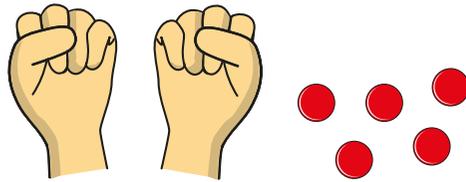
- Express missing number problems algebraically

# Solve 2-step equations

## Key learning

- Tommy has 17 counters.

He puts the same number of counters ( $c$ ) in each hand and has some left over.



Which equation shows this?

$c + 2 = 5$	$2c = 17$	$2c + 5 = 17$	$2c + 17 = 5$
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Solve the equation to work out how many counters Tommy has in each hand.

- Kay thinks of a number.

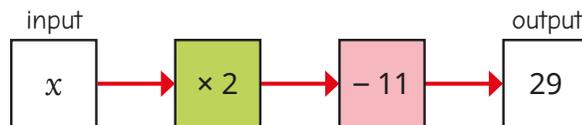
She multiplies the number by 2 and then adds 5

She gets the answer 29

What number did Kay think of?

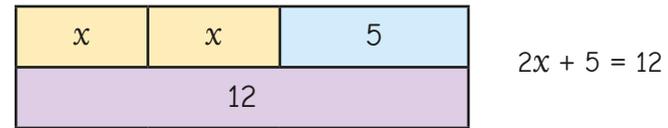
- Explain how this 2-step function machine shows the equation

$$2x - 11 = 29$$



Work out the value of  $x$ .

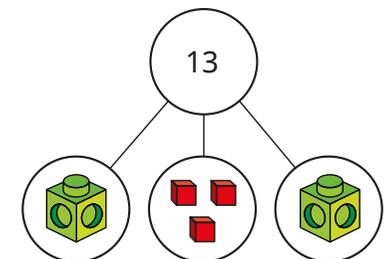
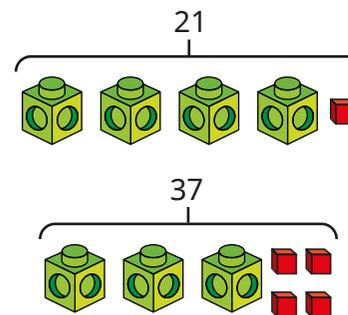
- Ron uses a bar model to solve an equation.



Use Ron's method to solve the equations.

$3b + 4 = 19$	$20 = 4b + 2$
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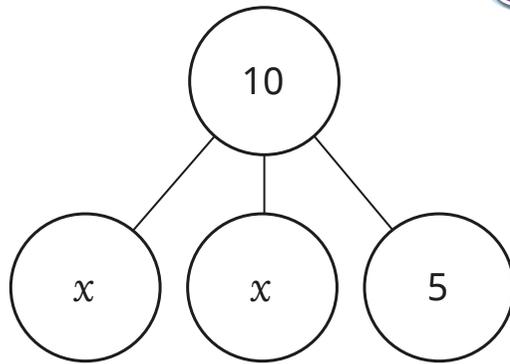
- Write and solve equations for the models.



# Solve 2-step equations

## Reasoning and problem solving

Tiny is working out the value of  $x$ .



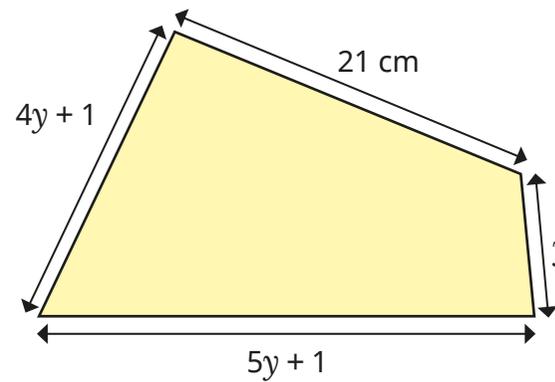
$10 - 5 = 5$ ,  
so  $x = 5$

Do you agree with Tiny?  
Explain your reasoning.



No

The perimeter of the quadrilateral is 83 cm.



$y = 6$  cm

Work out the value of  $y$ .  
Explain your method to a partner.

